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Quantitative ultrasonic bone assessment using backscatter measurements at 1 MHz PHILIP SPINOLO, Rhodes College, Department of Physics, BRENT HOFFMEISTER, Rhodes College, SANG-ROK LEE, University of Memphis, Department of Health and Sport Sciences, JINSONG HUANG, University of Tennessee Health Science Center, College of Medicine — Osteoporosis is a complicated metabolic degenerative bone disease affecting millions of Americans. The current standard for diagnosis is an x-ray technique called DXA, but ultrasound may offer a cheaper, more portable diagnosis method that may also be sensitive to bone strength in ways DXA is not. Ultrasonic backscatter techniques in the 5 MHz range have been shown to be sensitive to changes in bone mineral density (BMD) associated with osteoporosis. These techniques measure the power ratio between an earlier and later part of the backscatter signal. These ratios (called nMBD in the frequency domain or nBAR in the time domain) depend on ultrasonic attenuation in bone which is known to correlate with BMD. This study measured nMBD and nBAR using a 1 MHz transducer. Lower frequency transducers increase signal penetration into bone. Linear regression analysis was used to investigate correlations between nMBD and nBAR and the density and microstructural characteristics of bone such as the structural model index (SMI) and trabecular number (TbN). Good linear correlations were observed for nMBD and nBAR vs. BMD at r=0.75 and r=0.70, respectively, comparable to correlations obtained using a 5 MHz transducer. Correlations with SMI and TbN were within the r=0.65-0.75 range.

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